2nd order ODE solver

Oscillatory motions are represented by 2nd order differential equations,

$$\begin{aligned}\frac{dx}{dt} &= f(t,x,y) \\ \frac{dy}{dt} &= g(t,x,y).\end{aligned} \tag{1}$$

To solve the 2-dimensional equation, we need to implement the Runge-Kutta Method for 2-dimensional systems. Here is the Runge-Kutta iteration for 2-dimensional system,

$$\begin{aligned}
k_1 &= f(t_n, x_n, y_n) \\
l_1 &= g(t_n, x_n, y_n) \\
k_2 &= f(t_n + \frac{1}{2}h, x_n + \frac{1}{2}hk_1, y_n + \frac{1}{2}hl_1) \\
l_2 &= g(t_n + \frac{1}{2}h, x_n + \frac{1}{2}hk_1, y_n + \frac{1}{2}hl_1) \\
k_3 &= f(t_n + \frac{1}{2}h, x_n + \frac{1}{2}hk_2, y_n + \frac{1}{2}hl_2) \\
l_3 &= g(t_n + \frac{1}{2}h, x_n + \frac{1}{2}hk_2, y_n + \frac{1}{2}hl_2) \\
k_4 &= f(t_n + h, x_n + hk_3, y_n + hl_3) \\
l_4 &= g(t_n + h, x_n + hk_3, y_n + hl_3) \\
k &= \frac{1}{6}(k_1 + 2k_2 + 2k_3 + k_4) \\
l &= \frac{1}{6}(l_1 + 2l_2 + 2l_3 + l_4) \\
x_{n+1} &= x_n + hk \\
y_{n+1} &= y_n + hl \\
t_{n+1} &= t_n + h.
\end{aligned} \tag{2}$$

Based on the above Runge-Kutta method, solve

$$\begin{aligned}\dot{x} &= \mu x - y + xy^2 \\ \dot{y} &= x + \mu y + y^3\end{aligned} \tag{3}$$

with $\mu = -1.0, -0.5, -0.2, 0.0, 0.1, 0.5, 1.0$ and your initial conditions (choose several).
Draw your solutions in (x,y) domain with several paths from the above initial conditions.
Explain how your solutions change with various μs.
Discuss about Hopf bifurcation.